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Suppliers' Information Note

For The BT Network

SDH Customer Interfaces
At the STM-N level (where N=1,4,16)
Interface Characteristics

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1 Introduction

This Suppliers' Information Note (SIN) describes the characteristics of SDH customer interfaces to the BT Network at the STM-N level (where N=1,4,16) to support VC-12, VC-3 and other VC-4 based payloads (e.g. 140Mbit/s ATM, IP). It specifies interface characteristics based on published versions of ITU-T Recommendations and ETSI standards as detailed in Section 5.

Other SINs contain details of services delivered over the SDH interface.

2 Technical Specification

2.1 Electrical interface

The electrical signal interfaces at STM-1 SDH level only and conforms to the requirements of Recommendation ETS 300 166 [1].

2.1.1 Presentation

The physical presentation is via a pair of BNC unbalanced 75 Ohm sockets, one for each direction of transmission. The sockets conform to the general requirements of IEC 169-8 [2] with the mating dimensions specified in annex B of BS ISO/IEC 10173 : 1991 [3].

2.2 Optical interface

The optical signal interface is at STM-N (where N= 1,4,16 SDH level) and conforms to the requirements of ITU-T Recommendation G.957 [4]. The actual STM-N interface used will be dependent on the application (Table 1/G.957).

2.2.1 Presentation

The services are presented via an optical Single-Mode fibre connection conforming to ITU-T Recommendation G.957 [4] for SDH optical requirements. The optical fibre presentation at the UNI is conformant to BS EN 60825-1 [5] and BS EN 60825-2 [6] as a Class 1 Laser Product.

2.3 Basic Frame Structure Of STM-N

The basic frame structure of an STM-N signal conforms with Section 6.2 of ITU-T Recommendation G.707 [7]. The AU-4 option is be used. The STM-N payload comprises a VC-4 transported by means of the association of an AU pointer to form one AU-4 according to section 8.1.1 of ITU-T Recommendation G.707.

2.3.1 Bit rates

The bit rate of the STM-N conforms with ITU-T Recommendation G.707 [7].

2.3.2 Scrambling of STM-N framed signal

The STM-N is scrambled in accordance with Section 6.5 of ITU-T Recommendation G.707 [7].

IMPORTANT NOTE.

The BT STM-N Interface has been designed to support payloads which, after scrambling, exhibit no sequences of consecutive identical digits in excess of 72 bits, in line with ITU-T Recommendations G.783 [8] & G.798 [15].

Internet Engineering Task Force Specification Request For Comment (RFC) 1619 May 1994 for mapping the Internet Protocol (IP) into the SDH VC4 payload. Did not provide for scrambling when mapping IP into the SDH VC4 payload. The consequence of applying this mapping is the potential failure of the SDH link by either the terminal equipment or the network. Consequently, this mapping should not be used.

RFC 1619 has been superseded by RFC 2615 June 1999. RFC2615 provides additional payload scrambling, allowing full compatibility with SDH networks.

2.4 Section Overhead

The parameters below can be found in Section 9 of ITU-T Recommendation G.707 [7].

Field	Terminal to Network	Network to Terminal
A1, A2	As per G.707	As per G.707
J0	This field should be completed as per table 9-1 of G707. See note 1 for completion of 'X' bits. [X = value don't care bit]	This table will be completed as per table 9-1 of G.707. Completion of the 'X' bits can be done by local agreement. See note 1. [X = value don't care bit]
B1	As per G.707	As per G.707
E1	The network will ignore this field	The terminal should ignore this field
F1	The network will ignore this field	The terminal should ignore this field
D1-D12	The network will ignore these fields	The terminal should ignore these fields
B2	As per G.707	As per G.707
K1	Allocated for APS signalling for protection of the multiplex section.	Allocated for APS signalling for protection of the multiplex section.
K2	Allocated for APS signalling for protection of the multiplex section.	Allocated for APS signalling for protection of the multiplex section.

S1	The network will ignore this field	The terminal should ignore this field.
M1	As per G.707	As per G.707
E2	The network will ignore this field	The terminal should ignore this field
All other fields are reserved.		

Note. 1 - The format for this field is currently the subject of discussion within the standards environment and once completed will establish how this field should be used. For the time being, customers may use their own format in this field.

2.5 Path Overhead

It is strongly recommended that Path Trace (see note 2 below) and the Signal Label information be used as defined in G.707 [7]. Customers should generate the Path Bit Interleaved Parity (BIP): B3 byte for end-to-end path error monitoring. It also recommended that other path overhead information be used as described in G.707.

Note. 2 - The format for this field is currently the subject of discussion within the standards environment and once completed will establish how this field should be used. For the time being, customers may use their own format in this field.

2.6 Multiplex Section Protection (MSP)

Multiplex section protection (MSP) will provide a standby connection within the customer's premises, for STM-N links between BT's equipment and the customer's CPE in accordance with G.707. For STM1 links, this connection may be electrical or optical. For STM4 and higher the interface will always be optical. There are a number of software configurable options that can be set at time of commissioning as agreed with the customer.

2.7 Tandem Connection Monitoring (TCM)

Network operator byte: N1. This byte is reserved for use by BT, and should be ignored.

2.8 Connection Characteristics

2.8.1 Performance Information

Error measurements for the VC4 path are derived from the ITU-T Recommendation G.826 [9].

2.8.2 Jitter

2.8.2.1 From the Terminal to the Network.

The BT network will accept jitter in accordance with ITU-T Recommendation G.825 [10]. See notes 3 & 4.

2.8.2.2 From the Network to the Terminal

The level of Jitter from the network to the terminal will be in accordance with ITU-T Recommendation G.825 [10]. See notes 3 & 4.

*Note 3 - **Pointer Adjustment**: An operating characteristic of SDH equipment is the Pointer Adjustment mechanism which allows data generated from different source clocks to drift slightly out of alignment. The Administrative Unit (AU) pointer is adjusted to compensate for this frequency difference and correctly point to the Virtual Container start point. To minimise this characteristic, both for VC4 and lower rates such as VC12, it is recommended that the network and terminal clocks are synchronised together. Other clock sources that meet at least G.813 [11] can be used, but the inevitable pointer adjustments must be tolerated by the terminating equipment and the end applications.*

*Note 4 - **Network Synchronisation**: Under normal SDH network synchronisation conditions the signal transmitted towards the customer will be frequency locked to the SDH NTE synchronisation clock which in turn will normally be frequency locked to a signal traceable to BT's ITU-T Rec. G.811 [12] and ETSI ETS 300 462-6 [13] compliant Primary Reference Clock (PRC).*

3 Network Terminating Equipment (NTE) Power Supply Requirements

The NTE is locally powered and will require a local mains 50 Hz AC supply. It will be mounted in accordance with standard BT practices in agreement with the customer.

Where the NTE is powered by a customer provided –50 Volts, the NTE will be supplied with a connection lead which will be presented as wires only. As power supplies can vary slightly in output voltage and characteristics, the NTE will function with customer provided power supplies which are in accordance with the British Telecom Network Requirement, (BTNR) 2511 [14].

4 Further Information Contact Point

For enquiries concerning connection availability between particular sites and for further "sales and marketing" information, please contact the Data Connect Helpdesk. If you have enquiries relating to this document then please contact: sinet.helpdesk@bt.com

5 References

[1]	ETSI Recommendation ETS 300 166 - Physical and electrical characteristics of hierarchical digital interfaces for equipment using the 2048K bit/s based plesiochronous or synchronous digital hierarchies
[2]	British Standard IEC 169-8 - Radio-frequency connectors - Part 8 : R.F. coaxial connectors with inner diameter of outer conductor 6.5 mm (0.256 in) with bayonet lock - Characteristic impedance 50 ohms (Type BNC)
[3]	British Standard BS ISO/IEC 10173 - Integrated Services Digital Network (ISDN) Primary Access Connector at Reference Points S and T
[4]	ITU-T Recommendation G.957 - Optical interfaces for equipment's and systems relating to the synchronous digital hierarchy
[5]	British Standard BS EN 60825-1 - Safety of Laser Products Part 1 Equipment classification
[6]	British Standard BS EN 60825-2 - Safety of Laser Products Part 2 Safety of Optical fibre communications systems
[7]	ITU-T Recommendation G.707 - Network node interface for the Synchronous Digital Hierarchy (SDH)
[8]	ITU-T Recommendation G.783 – Characteristics of Synchronous Digital Hierachy (SDH) equipment function blocks.
[9]	ITU-T Recommendation G.826 - Error performance parameters and objectives for international constant bit rate digital paths at or above the primary rate
[10]	ITU-T Recommendation G.825 - The control of jitter and wander within digital networks which are based on the synchronous digital hierarchy (SDH)
[11]	ITU-T Recommendation G.813 - Timing characteristics of SDH equipment slave clocks (SEC).
[12]	ITU-T Recommendation G.811 - Timing requirements at the outputs of reference clocks and network nodes suitable for plesiochronous operation of international digital links
[13]	ETSI Recommendation ETS 300 462-6 - Transmission and Multiplexing (TM); Generic requirements for synchronisation networks; Part 6: Timing characteristics of primary reference clocks
[14]	BTNR 2511 - Interface of telecomms equipment with a nominal 48v negative dc power supply
[15]	ITU-T Recommendation G.798 – Characteristics of Optical Transport Network Hierachy equipment function blocks.

6 Abbreviations

APS	Automatic Protection Switching
AU	Administrative Unit
BNC	Bayonet Neil-Concelman
BS	British Standard
BTNR	British Telecom Network Requirement
ETS	European Telecommunication Standard
ETSI	European Telecommunications Standards Institute
IEC	International Electrotechnical Commission
ITU-T	International Telecommunication Union For Telecommunications (formerly CCITT)
MSP	Multiplex Section Protection
NTE	Network Terminating Equipment
PRC	Primary Reference Clock
SDH	Synchronous Digital Hierarchy
SIN	Suppliers' Information Note
STM	Synchronous Transport Module
TCM	Tandem Connection Monitoring
TE	Terminal Equipment
UNI	User Network Interface
VC	Virtual Container

7 History

Issue 1	November 1999	First Issued.
Issue 1.1	July 2002	Editorial changes / ITU G.707 references updated to reflect 10/2000 isssue.
Issue 1.2	June 2003	Recommendation G.958 (withdrawn by ITU-T) replaced with reference to ITU-T Recommendations G.783 & G.798. Approval Requirements statement removed, information available via SINet Useful Contacts page.
Issue 1.3	September 2014	Change SINet site references from http://www.sinet.bt.com to http://www.btplc.com/sinet/
Issue 1.4	July 2020	Change SINet site references from http://www.btplc.com/sinet/ to https://www.bt.com/about/sinet
Issue 1.5	October 2023	Change of registered address

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